15. $x^3+y^3=xy$ where slope is defined (not defined)

$3x^2+3y^2y'=xy'+y$

$3y^2y'-xy'=y-3x^2$

$y'(3y^2-x)=y-3x^2$

$y'=\dfrac{y-3x^2}{3y^2-x}$

$3y^2-x=0$

$3y^2=x$

slope not defined

$y=0$ $x=0$

$y=\dfrac{\sqrt[3]{2}}{3}$ $x=\sqrt[3]{4}$

solve$(x^3+y^3=x\cdot y,y)\,|\,x=3y^2$

Sep 25-8:59 AM

3.7b Implicit Differentation

Show that dy/dx is defined at every point on the graph of $2y=x^2+\sin(y)$

$2y'=2x+\cos y\cdot y'$

$2y'-\cos y\cdot y'=2x$

$y'(2-\cos y)=2x$

$y'=\dfrac{2x}{2-\cos y}$

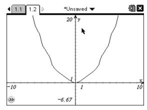
$\frac{dy}{dx}$ undefined:

$2-\cos y=0$

$2=\cos y$

can't happen

$\cos y\leq 1$



Graph the curve using parametric equations

$x^2=2y-\sin y$

$x=\pm\sqrt{2y-\sin y}$

$x_1=\sqrt{2t-\sin t}$ $\quad x_2=-\sqrt{2t-\sin t}$

$y_1=t$ $\quad y_2=t$

Sep 29-7:40 AM

$x^2-2xy+y^2=4$

1. Find dy/dx

$2x-(2xy'+2y)+2yy'=0$

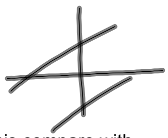
$2x-2xy'-2y+2yy'=0$

$-2xy'+2yy'=-2x+2y$

$y'(-2x+2y)=-2x+2y$

$y'=\dfrac{-2x+2y}{-2x+2y}=1$

2. Use dy/dx to sketch a possible graph of the implicit curve.



3. Factor the left side and solve for y. How does this compare with your graph?

$(x-y)(x-y)=4$ $\quad (x-y)^2=4$ $\quad y=x\mp 2$

$x-y=\pm 2$

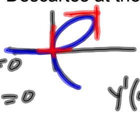
Sep 29-8:00 AM

Prove the power rule for rational exponents

Sep 29-8:12 AM

Find the slope of the Folium of Descartes at the points (4,2) and (2,4).

$x^3 + y^3 - 9xy = 0$ p157



$3x^2 + 3y^2y' - (9xy' + 9y) = 0$

$3x^2 + 3y^2y' - 9xy' - 9y = 0$

$3y^2y' - 9xy' = -3x^2 + 9y$

$y'(3y^2 - 9x) = -3x^2 + 9y$

$y' = \dfrac{-3x^2 + 9y}{3y^2 - 9x}$

$y'(4,2) = \dfrac{5}{4}$

$y'(2,4) = \dfrac{4}{5}$

Find the points where the folium has: (a) a horizontal tangent;
(b) a vertical tangent

a) $-3x^2 + 9y = 0$ $\quad y = \dfrac{3x^2}{9} = \dfrac{x^2}{3}$ $\quad x = 0$, $y = 0$; $\quad x = 3\sqrt[3]{2}$, $y = 3\sqrt[3]{4}$

b) $3y^2 - 9x = 0$ $\quad x = \dfrac{y^2}{3}$ $\quad y = 0$, $x = 0$; $\quad y = 3\sqrt[3]{2}$, $x = 3\sqrt[3]{4}$

Sep 29-8:15 AM

Sep 25-10:23 AM